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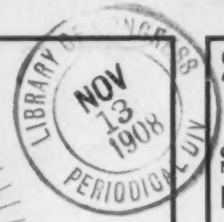

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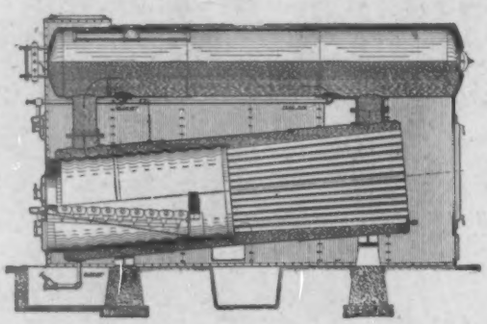

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THE NATIONAL FORESTS

The Development, Use and Conservation of Their Resources

By F. G. Baum.

1. There has been a great deal of discussion of our National Resources, and the conservation of these resources for future generations. To discuss intelligently from an economic standpoint the conservation of resources, we must consider the *development and use* of resources as well as their *conservation*. To conserve the resources, without development and use, is like putting money into a safe deposit box, which, of course, is not an economical thing to do, for, if done by all, the entire business of the country would stagnate.

The following discussion gives some facts in regard to the forest resources and especially water resources. Water power undeveloped is a continual waste. The development and use of the water power resources of the country is believed to be one of great importance to the nation as a whole and particularly to the various sections of the country having water power resources.

2. There have been withdrawn from entry in *fifteen* Western States about 162,000,000 acres, or over 253,000 square miles of territory, and been placed in forest reserves to insure timber and water for all time. The combined area of New Hampshire, Rhode Island, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina and South Carolina is 267,000 square miles. The States above named are twelve of the original thirteen States. The lands withdrawn are public lands held in trust by the United States for the people.

The Source of Much of the Water for Power Purposes in the Sierra Nevada Mountains. This Picture Was Taken in August

3. There has been a great deal of discussion as to the policy to be pursued in operating the forests. There is practically no protest against the maintenance of the forests to provide an endless supply of timber. In the formation of States and counties it was the intention to ultimately transfer all the public lands to the people, who would then pay taxes to the counties and States; and each district, county or State would then develop along the lines of its natural resources and position. It is believed that a forest policy which will keep as closely as possible to this original intention, consistent with the operation of the forests under a uniform policy, will be fair to all the people, and will be approved by all interests. In order to arrive at a logical conclusion, let us look at some facts.

4. The percentage of the forest reserves in *ten* of the States is approximately as follows:

	% of All Reserves.	Acres.
California	14%	22,278,631
Idaho	13%	20,336,427
Montana	13%	20,402,663
Colorado	10%	15,748,772
Oregon	10%	16,463,535
Washington	8%	12,065,500
Arizona	6%	9,422,125
Wyoming	6%	9,020,475
Utah	5%	7,127,339
New Mexico	5%	8,279,584
Total—ten States	90%	

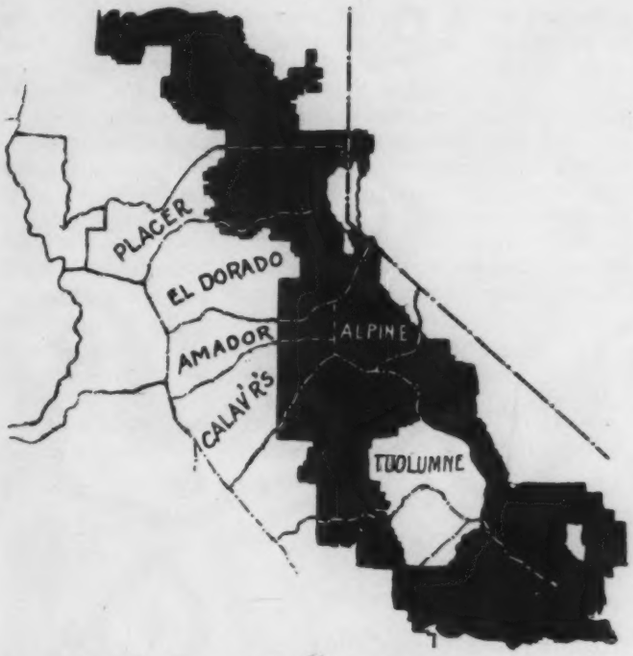
The remaining 10% of all the forests of the United States is included in the States of Kansas, Nebraska, Nevada, Oklahoma, and South Dakota. About 36.5% of the area of Idaho, 27% of Washington, 26.5% of Oregon, 22.5% of Colorado, 22% of California, 21% of Montana, and 13% of Utah is in the national forests.

Areas and Locations of National Forests

The percentages of the area of some of the counties in the reserves in California are: Alpine, 82%; Plumas, 77½%; Placer, 54%, and from the last value down to zero.

See cut of these and also of those of Idaho where 71.5% of Idaho County is within the reserve.

5. It can readily be seen that the withdrawal of the lands in these States and counties to insure timber for other States will have a great influence on the development of the States and counties, especially those from which the lands are withdrawn. As said above, it was intended in the formation of the States that ultimately all these lands would pass to the



Proportion of Counties in California Within Forest Reserves

inhabitants of the States, and then all revenues derived from them would be collected by the States and counties. In the operation of the forests, therefore, we should try as far as possible to keep to the original intention of the transfer of the lands to the people, and their taxation by the counties and States, in order to keep faith as far as possible with the people who went West (consistent with the fact that the forests are to be conserved in order to have an endless supply of timber and water), and at great expense partly developed the natural resources and located near the forests because of the advantage of such location. It is believed to be logical to give the greatest benefits from the resources to the people in the immediate district, then to those of the county, then of the State, and then of the United States. By keeping as close as possible to the original intention of having the lands owned by the people in the States, we will remove nearly all local, county and State objections to the operation of the forests by the United States.

6. It would not be fair to draw the people out West by these resources, and then have the United States turn "Indian giver," and take away what was promised. We have promised self-government to the Cubans and the Filipinos and to allow their industries to support their own government, and we will keep faith with them. The people of the West deserve as much consideration as the Cubans and the Filipinos, and Western water power and other resources should not be taxed (as has been proposed) to build up and develop worn-out or impractical propositions in the East. It would be as consistent to tax the productive Western farms to improve those worn out or destroyed in the East.

7. President Roosevelt said at the recent conference for conservation of natural resources:

"Where that policy can best be carried out by the States, carry it out by the States; where it can best be carried out by the nation, carry it out by the nation. My concern is not with the academic side of the question. My concern is in the employment either of the State rights or the principle of national sovereignty, as it will best conserve the needs of the people as a whole."

Bryant B. Brooks, Governor of Wyoming, said:

"Personally, I am strongly inclined to the belief that the proper conservation of our natural resources can better be promoted and safeguarded by arousing local interest in the subject, and by enacting strong and suitable laws in our State Legislatures, and giving the States the widest possible power and control, rather than by turning everything over to Federal authority, to be controlled through Federal bureaus."

Quoted from "Forestry and Irrigation," June, 1908:

"Hon. B. B. Comer, Governor of Alabama, was recognized and made a short talk, following the President's suggestion that those Governors who had not been heard be called on for their contribution to the discussion. Governor Comer dwelt on the resources of Alabama and on the State's waterways, saying, however, that his sentiments were much the same as those of Governor Folk, and that he hesitated to take a stand for turning over the control of waterways and resources to the national government."

Senator Heyburn, of Idaho, in the debate before the Senate on the Agricultural Appropriation Bill said:

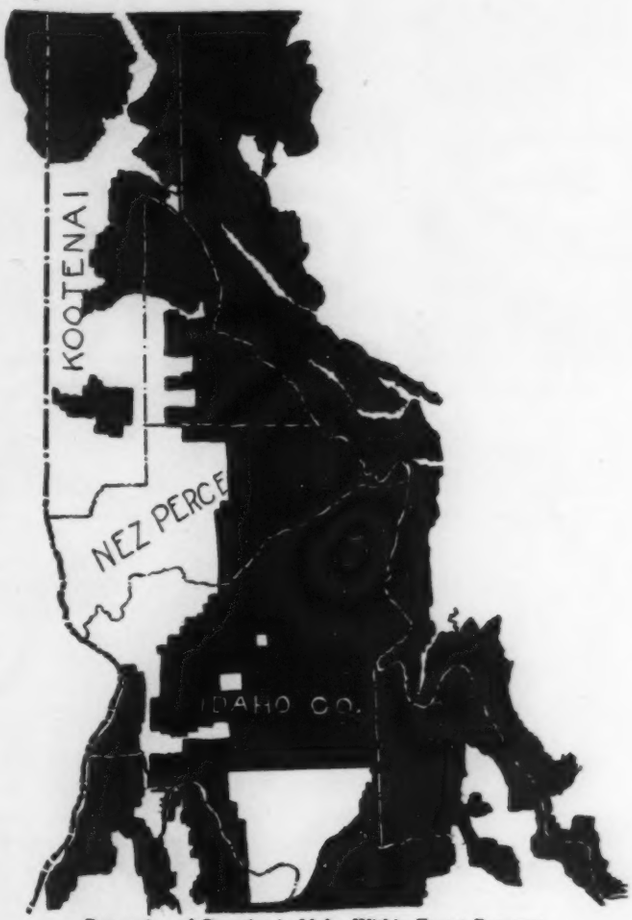
"It has been repeated on this floor that these lands (the forest reserves of Idaho) belong to all the people of the United States. So they do. But they must come to the State of Idaho to get their property. They cannot take that inheritance out of the State. We welcome them. But non-resident ownership of land is the bane of any country on earth. . . . Come and get your land; it is yours; but bring with it the responsibility of citizenship and the contribution to the wealth of the State where the land is."

Senator Bacon, of Georgia, said:

"I entirely agree with what I have heard Senators discussing for the past few days as to the great injustice done to certain States in setting apart these vast tracts, such large portions of the territory of the States, for reserves and in that way practically excluding them from settlement and development and subject to State taxation."

Senator Newlands, of Nevada, said:

"I am sure that if these lands were subjected to taxation under the ordinary rate that prevails of from 2½ to 3 per cent, those States would absorb the entire receipts, instead of only 25 per cent."



Proportion of Counties in Idaho Within Forest Reserves

8. To show the extremes to which people will go when not giving due consideration, one should note Governor Folk's remarks that he would tax "Missouri's water powers *to improve the rivers and support the entire State government.*"

Governor Folk's remarks before the Conservation Congress held recently at Washington are as follows:

"If the Government does not care to undertake the permanent improvement of the Missouri River," he went on, "and if the consent of the Government is granted, Missouri is willing to undertake the work, provided that, by act of Congress, Missouri is given the right to use the water power generated by the river." Applause followed his announcement that Missouri would undertake to do this work *and to pay for it out of the revenues derived from the sale of the water power, and not only that, but would run the State government out of such revenues also.* "And," he stated, "he believed that every State through which courses a navigable stream could and would undertake the same work, under similar conditions."

9. The injustice of taxing one industry to support the State and other interests is so unjust as to be absurd. When a statement like the above is applauded by the Governors of the States, there is abundant reason for the uneasiness felt by capital.

10. It is believed that a plan can be devised by which all objection which might be offered by the States and counties from the operation of the forests by the national Government would be removed. The plan must, as far as possible, follow the original intention of having these lands owned by the people, and allow development along natural lines.

11. The fundamental proposition is that the forests are to be maintained and operated to produce timber for all time. If the States would pass a uniform law for the operation of the forests consistent with the above, the forests could be transferred, or at least their operation, to the various States. The State could then operate the forests so that, as far as possible, each county and district could obtain the advantage of its local resources and develop along natural lines. This would come as near to the original intention of transferring the lands to the people, who would pay taxes on the lands in the counties in which they are situated. This plan may not be feasible at the present time, or advisable, because it may not be possible to obtain the same uniform policy in all the States.

12. A plan which is next to this, in recognizing, as far as possible, the local resources as local assets, is to have the forests operated by the United States at *cost,* and allow the *profits* resulting to go to the various counties and States *and to allow each State and county or district to develop, as far as possible, along natural lines.* The United States Government now pays 10 per cent of revenues from forests to States to compensate for loss of taxes; next year there will be paid 25 per cent of revenues. If the operation is consistent with conservation, all the people will derive the indirect benefits due to the forests just as they would if the lands had passed to individuals as originally intended.

13. It can be shown, I believe, that the National forests can be made to supply forage, timber, and water for all time and still allow each State, county, or district to develop along the line of its natural resources. At the same time, all the people will derive the indirect benefit of the forest products and also the insurance of a continuous supply of timber.

14. There are four principal industries and products in the forests, and four main sources, or probable sources, of revenue. The others are insignificant and need not be considered. The four products of the forest are *Minerals, Forage, Timber,* and *Water.* We shall see that the last two are the most important, and I believe the fourth is most important, although the value of the fourth depends some on the third. The interests which should support these are the mining, grazing, timber, power, irrigation, navigation, etc.

15. The forests are to be conserved *for use and not for profit,* and each *interest* should support itself as far as possible, as an economic problem, just as in any business each department must justify itself, otherwise there will be dissatisfaction.

16. In order to have a clearer understanding of the situation, let us consider each product of the forest separately and note what each industry adds to or takes away from the forest, what it adds to or takes away from the county or State, and what it adds to or takes away from the general good, and with the facts as a basis we may make a just and logical deduction as to the charge each industry should pay for what it obtains from the forests, from the State, and from the people or the United States as a whole.

Minerals.

17. Under the present laws the prospector may go into the forest reserves, as on to any other public lands, and locate and patent a claim. The miner pays for lands required for mill sites, etc., and pays for timber. Rights of way for the construction and maintenance of dams, reservoirs, water plants, ditches, flumes, pipes, tunnels, and canals are granted so long as they are used, without cost and without filing any maps. The miner pays no royalty on the output of the mine. Hence the miner operates in the forests as he does anywhere else.

18. The miners of the West really opened up the West, and the mountainous country in particular, by constructing trails, roads, ditches, reservoirs, cabins, telephone lines, etc., all of which the forests now have at no expense. The mineral taken from the mines has its greatest effect upon the local community, but it also has its effect upon the general wealth of the country. The miner is, therefore, not charged a royalty, but is given every encouragement to prospect and mine in the forests. The miner obtains free and permanent rights without royalty.

Grazing.

19. The grazing privileges are generally given to nearby settlers, and hence conform to the general proposition that the people of the district should have first call on the resources; and the Summer feed obtained from the ranges is valuable to them because the small homesteader can raise stock and dispose of it without himself owning large areas of land. The range is looked after by the Forest Service, and the homesteader is at no expense except to drive his stock on to the range, herd it during the Summer and take it off the range when the snow comes. The improvements on the ranges, the building of fences, etc., is done at the expense of the Forest Service, which also has rangers to see that each stockman remains on the lands allotted to him and does not overstock the range so as to destroy it. The Service also protects the range against fire, assisted in this by the users.

20. For the privilege of grazing, the stockman pays the Forest Service about seventy-five cents per year per head for cattle, and twenty-five cents per year for sheep. These rates are generally less than one-half the rates charged by private interests, there being no attempt on the part of the government to obtain all that can be had from the grazing privileges.

21. The stockman does not improve or benefit the range, hence no credit account is due him. The logical method of determining the amount to be charged for the grazing privilege is to calculate the cost of what is furnished by the Government (since the forests are not operated for profit), and a charge made per head for stock accordingly, in order to make the income equal the expenditures. The margin should, of course, always be on the safe side. The stockman would pay a proportion of the general expense at Washington and a proper proportion of the expense of operating the particular forest.

22. This plan is, of course, followed by every business man who makes each department stand upon its own merits, and the Grazing Department of the National Forests should not contribute to or be supported by the Mineral Department, the Timber Department, or the Water Department.

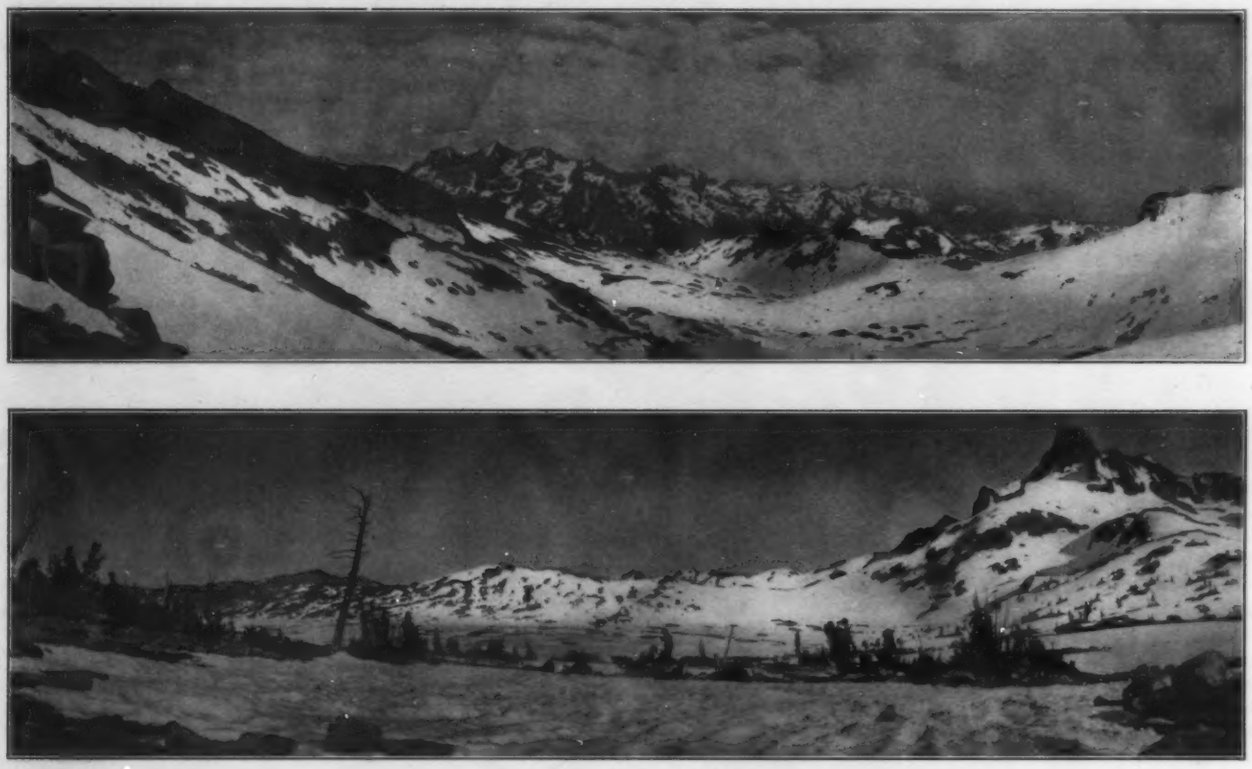
23. The general public in the district, county, State, and the United States get the advantage of the grazing in the

forests in lower prices of meat. To tax grazing interests more than enough to maintain the forests would be equivalent to a tax on the consumers of the meat.

Timber.

2. The forests produce timber and may be made to produce an annual crop of timber for all time. The timberman goes into the forests and removes the timber, and generally is at no other expense. He is required to burn the brush and take all precaution against damaging, but he is not now required to do replanting.

25. Since the Government is not in the business for profit, the market price of timber should have no bearing on the charge for the timber. The charge made by the Government for timber should be based on the cost of producing the same. This would include, of course, part of the general expense at Washington, part of the expense of the local office, all the expense incident to the timber selling, etc., and the expense of replanting so as to have an endless supply. This replanting



Courtesy Sierra Club — Natural Reservoirs Formed by Drifted Snow — Photo by E. T. Parsons

may be in the same reserve, or in another, but, since timber is a product which can be distributed, the ultimate cost of the timber crop must fall on the purchasers of the lumber products. The timber cost should be kept as low as possible to keep down the price of lumber, and, with the timber in the ownership of the United States for the States, the cost of lumber to the purchaser will be fixed by the cost of the timber, the cost of manufacture and transportation and selling.

26. An increase in the cost of timber must only add the same to the cost of the lumber, and, therefore, any profit on the timber, should the Government make one, must in the end come out of the pockets of those who use the lumber. It does not seem right, therefore, to sell the timber to the highest bidder as is done. Not only the man who cuts up the logs into lumber, but the ultimate owner of the lumber, benefits by the reserves if they result as they should in lowering the price of lumber.

Water.

27. The power company obtains land for reservoirs, power house sites, rights of way for canals, pipe lines, etc., and for these he is justly required to pay the Government. The power man at present can receive from the Government only a *temporary permit* for the construction of reservoirs, canals, pipe lines, and power houses in National forests. These permits are revocable at the will of the Secretary of Agriculture. And the permits are further subject to a charge by the Government to be fixed by the Secretary of Agriculture. The charge is now fixed on the basis of the output of the plant.

28. The power companies have undoubtedly been guilty of many wrongs of which they are accused. However, they have never done anything more unjust or for which they could be more severely censured than the people who passed such a law as now regulates the development of power in the national forests. *It is entirely unjust, discriminatory, and may result in confiscation of property through the whim of some official.*

The language of the law is as follows:

"And provided further, that any permission given by the Secretary of the Interior under the provisions of this Act may be revoked by him or his successor in his discretion, and shall not be held to confer any right, or easement, or interest in, to, or over any public land, reservation, or park." (The Use Book.)

29. The unjustice of a charge upon the output of the plant can be seen from the fact that a man may construct reservoirs in the forest and pay a ropalty to the Government on the power developed, and a power company operating outside the reserve may obtain the advantage of reservoirs built by the man in the reserve and pay nothing to the Government. This could be remedied by levying a State tax, which would reach all companies. The injustice of charging one interest to support another, or one district to support another, is evident. Each district should, as far as possible, be allowed to develop along the line of its own resources. Some examples will suffice to illustrate this point.

30. The Reclamation Service, in charging for reclaiming lands, takes each district and applies all the cost equally to all the lands to be irrigated. If one water-shed district offers opportunities for developing a project for $20 per acre, that

is the charge made, although in the adjacent water-shed, or district, the charge may be $40 per acre. That is, the principle is recognized that the people settling in a particular area are entitled to all the natural resoures belonging thereto. On power development, the man who develops a project in one water-shed is entitled to all the natural advantages belonging to that area, and he should not be made to pay to help develop power on an adjacent water-shed or in another State.

31. Suppose again that the Government withdraws a given timber area in order to assure ties to several railroads that traverse it. What is a fair compensation for the ties? A charge on the gross or net revenue of the road, or a rate on the tonnage passing through the reserve, would be absurd; the only fair charge would be on the value of the ties, calculated on the yearly expense of maintenance of the forest and the number of ties it can produce annually. Why then should the water power company pay a royalty on the basis of its power output? The grazing and timber interests are not taxed with the idea of producing a profit to the Government, or that the grazing or timber interests of one section should support those of another, or that these interests should be taxed to support others. The miner is not charged a royalty by the Government, but the Government can rightly charge him for any direct benefit he may receive by reason of the service maintained within this forest.

The Upper Course of a Typical Sierra Stream

32. By all precedent, then, the principle is well established that the Government should calculate the cost of what is furnished, and the conservation charge be then made accordingly. This would establish the principle that the annual conservation charge should be based on the actual yearly cost to the Government of the conservation. The conservation charge would change from time to time, but there would be a definite basis for its determination. *If a privilege or franchise tax is paid, it should be to the State, and not to the United States.*

33. Rights of way on lands occupied for reservoirs, pipe lines, and power houses should be sold to the power company at a fair value, and these lands would not then enter into the determination of the conservation charge. Rights of way and lands necessary for the development should be the property of the company, or the rights should be granted for, say, fifty years, with some basis set for renewal. These matters should be fixed independent of the conservation charge. We should not expect railroads to open up new country if their rights of way were revocable, or if they were charged on the basis of tonnage carried over the right of way.

34. To show the unreasonableness of the charge being based on the output of the plant, we may merely cite the fact that if the charge is based on the kilowatt output, the man who puts in a cheap and wasteful system pays less than the man who puts in a more expensive and efficient system. Further, the man who sells his power for $20 per kilowatt year pays double the percentage paid by the man who sells for $40 per kilowatt year. And again, the man who takes this power to a market, say 100 to 300 miles away, must pay to the Government for the losses and expense in doing so, and pays more than the man who sells to the home market. *The man who reaches out with his power is equalizing conditions,* just as railroads equalize conditions by their transportation facilities, and should be encouraged and not be taxed for doing so.

35. Consider the case where the Government owns part of the property necessary for the conservation and development, and part is owned by private parties, or the man making the development. For example, assume that the power company making the development owns a reservoir which controls the stream. Assume that this reservoir is the controlling feature of the development, that without it the stream is virtually worthless. It may even be that the reservoir is all that is necessary, and the protection of the timber could have no effect on the development, and its removal would not affect the development in the least. Has the Government a right to make a conservation charge when as a matter of fact the man is paying for his own conservation? In this case the Government should charge only for rights of way and lands occupied, and no conservation charge can be justly made. If the Government furnishes part of the conservation—this is usually the case—then a proper proportion of the basic rate of the conservation charge can be made.

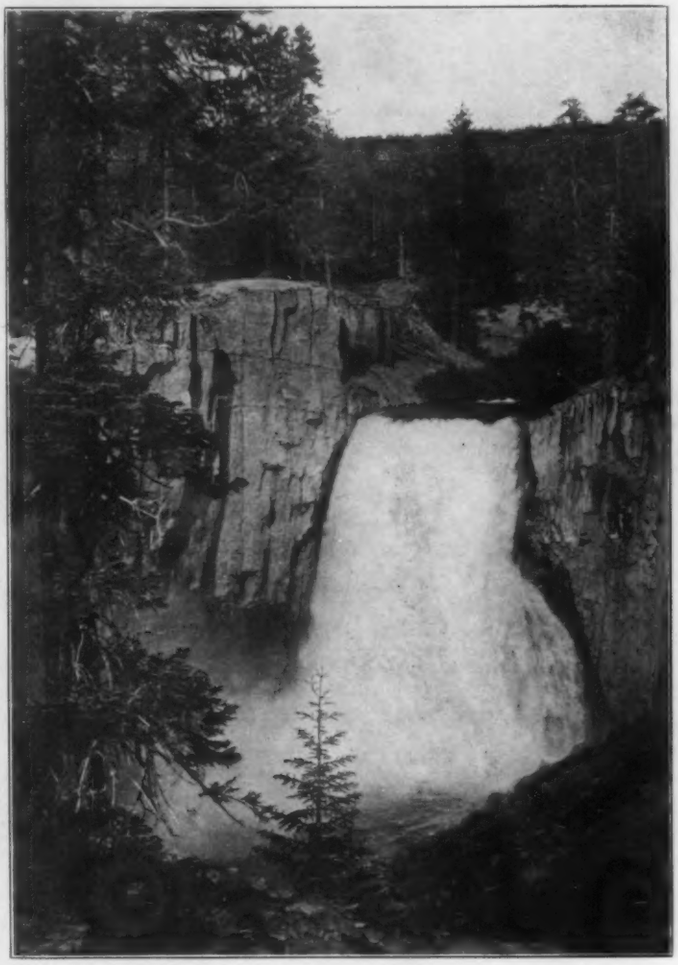
36. This may be illustrated by taking the case of a man owning a timber area to which he had title before the establishment of a reserve. In order to make use of the timber it is necessary to obtain from the Government land for the mill site and right of way for a railroad from the timber to the mill site. A proper charge for the land for the mill and right of way can only be made on the basis of the value of the lands occupied. A charge on the output of the mill would be entirely unjust; this must be admitted. Change the timber area to a reservoir, the mill site to a power-house site, and the railroad to a pipe line, and wherein lies the difference? The man purchased the reservoir lands to store water and develop power before the reserve was established. In order to do this he must have the right of way for pipe line and land for power-house site, etc., and these should be granted him, as in the case of the sawmill, on the basis of the land value, and not on a royalty of the power output. No royalty should be charged for giving the man the only opportunity there is for making use of his property. Any number of parallel cases could be cited to illustrate the principle. In creating a forest reserve, the Government cannot but recognize the rights of private individuals or companies who owned the lands in the reserve previous to its establishment, and the Government must allow owners the use of their property. Any other course would amount to confiscation.

37. The benefits from the conservation of water are, to a certain extent, general, as it is of general good to maintain the streams and to prevent floods. The special advantage is derived by the man who develops power, the farmer who irrigates his land, and the navigation interests. As shown above, the man outside the reserve receives the benefits at the cost of the man in the reserve.

38. The benefit to navigation is to the benefit of the people generally, so that, except in special cases, as in the construction of locks, etc., the navigation interests should not be made to pay for the benefit derived merely from the withdrawal of the timber to conserve the water if such can be proven. The farming interests should derive without charge also any such benefit as results from the withdrawal of timber to preserve the same and to conserve the water.

39. The power interests use lands, timber, stone, etc., and for these should pay a reasonable price. In so far as the withdrawal of timber benefits the stream, the power man is debtor. Credit must, however, be given the power man for benefits added to the forest at his expense, such as the construction of roads, trails, telephone lines, etc., all of which the Government uses without charge. The general public also obtains the advantage of the roads, trails, etc., which make the country accessible.

40. Where the power company equalizes the flow of a stream by constructing reservoirs, it is benefiting all interests. To impose a tax for the benefit derived by the power company from its own expenditure would be entirely unjust, and especially since the power privilege, by the construction of reservoirs and the regulation of the stream helps the farmer and others depending upon that stream. The tax on the power company should be determined exactly as is the charge made against the grazing and the timber interests. To levy a privilege or franchise tax (by the United States) to bring a revenue over and above that which can be used economically within the water-shed *is merely adding to the cost of power to the users*, as the power company will merely add the charge made by the Government to its power bills, and the burden will fall upon the users of that power. To add to the cost of power will stop the development of many industries, and necessarily the development of the country and the increase in population.



An Undeveloped Sierra Water Power

41. California has no coal, but has abundant water power; to tax this water power will have the effect of retarding the natural development of California, as California is entitled to the advantages of its natural resources. The same is true of all the Western States. To tax the California water resources and apply part of the proceeds to Eastern States would be equivalent to taxing Pennsylvania's coal resources and applying part of the proceeds to California. California's water resources belong to the State. Mr. Gifford Pinchot in the "Use of the National Forests" says: "The creation of a national forest has no effect whatever on the laws which govern the appropriation of water. This is a matter governed entirely by State and Territorial laws." A tax on the water resources applied outside the State *is equivalent to a tax on the power users of California by other States.*

42. The proper development of water powers would utilize resources now continually going to waste; the development of coal mines, on the other hand, means the complete and final consumption of resources now stored and available at any future time. Every hydro-electric horsepower saves the consumption of about twelve tons of coal per year. Therefore the proper development of the water powers would conserve the country's coal resources to that extent. For example, 1,000,000 hydro-electric horsepower transmitted to New York and its vicinity for manufacturing purposes would result in saving about 12,000,000 tons of coal per year. This coal could be reserved for domestic purposes. This is about 20,000 cars of 50 tons each per month, or 666 cars per day. The development and use of less than 25 per cent of California's available water powers would stop all wood, oil, and coal burning for power purposes in this State. The same is true for nearly all the Western States and a great many of the Eastern and Southern States.

43. Therefore the development of water power has a three-fold benefit: It makes use of resources now going to waste; conserves coal, oil, and wood for future use; and reduces the cost of power. As already shown, the development of water power develops also the forests and the country, equalizes conditions by making cheap power available over a large territory, develops new industries, increases population, etc.

Attention is directed to the fact that in the West (and this is where the greater part of the forests are located) the areas of greatest value for maintaining and equalizing run-off lie wholly above the timbered areas, the region coming most directly within the jurisdiction and care of the forest service.

Above the timber line the wind has free sweep and the snow is blown into enormous drifts forming natural reservoirs, which retain the water long after the snow in the lower timbered areas has melted and run off. It is upon these chiefly that the power man depends for the maintenance of a high average run-off.

An excellent article dealing with this problem was presented in the September, 1908, Proceedings of the A. S. C. E., by Major H. M. Chittenden, and his conclusions (see pages 959-60-61) are given below:

"In the following seven propositions the author sums up the arguments presented in the foregoing pages:

(1) The bed of humus and debris that develops under forest cover retains precipitation during the Summer season, or moderately dry periods at any time of the year, more effectively than do the soil and crops of deforested areas similarly situated. It acts as a reservoir moderating the run-off from showers and mitigating the severity of freshets, and promotes uniformity of flow at such periods.

(2) The above action fails altogether in periods of prolonged and heavy precipitation, which alone produce great general floods. At such times the forest bed becomes thoroughly saturated, and water falling upon it flows off as readily as from the bare soil. Moreover, the forest storage, not being under control, flows out in swollen streams, and may, and often does, bring the accumulated waters of a series of storms in one part of the water-shed upon those of another which may occur several days later; so that, not only does the forest at such times exert no restraining effect upon floods, but, by virtue of its uncontrolled reservoir action, may actually intensify them.

(3) In periods of extreme Summer heat forests operate to diminish the run-off, because they absorb almost completely and give off in evaporation ordinary showers which, in the open country, produce a considerable temporary increase in the streams; and, therefore, while small springs and rivulets may dry up more than formerly, this is not true of the larger rivers.

(4) The effect of forests upon the run-off resulting from snow-melting is to concentrate it into brief periods and thereby increase the severity of freshets. This results (a) from the prevention of the formation of drifts, and (b) from the prevention of snow-melting by sun action in the Spring, and the retention of the snow blanket until the arrival of hot weather.

(5) Soil erosion does not result from forest cutting in itself, but from cultivation, using that term in a broad sense. The question of preventing such erosion or soil wash is altogether one of dispensing with cultivation or properly controlling it. The natural growth which always follows the destruction of a forest is fully as effective in preventing erosion, and even in retaining run-off, as the natural forest.

(6) As a general proposition climate, and particularly precipitation, have not been appreciably modified by the progress of settlement and the consequent clearing of land, and there is no sufficient reason, theoretically, why such a result should ensue.

(7) The percentage of annual run-off to rainfall has been slightly increased by deforestation and cultivation.

If the foregoing propositions are correct they enforce two very important conclusions, one relating to the regulation of our rivers, and the other to forestry.

It follows that no aid is to be expected in the control or utilization of our rivers, either for flood prevention, navigation or water power, by a practicable application of forestry. Remember always, that it is the extreme of flow, not the medium condition, that controls the cost of river regulation. It is the floods and low waters that measure the cost. Any scheme of control that is not based upon these is worthless. This proposition need scarcely be urged upon the experienced engineer. For himself he would never place any real reliance upon forestry. Called in consultation, for example, in the problem of protecting the City of Pittsburg from floods he would be bound to take as his measure of the problem the highest recorded flood on the river with a good factor of safety on that, and then figure out by what methods—artificial reservoirs, levees, raising of grades, or clearing the river channel of artificial obstructions—he would obtain the desired relief. He would not dare, as the physician in the case, to advise his patient that he could dispense with or lessen in any degree the application of the remedies proposed, nor save one dollar of the cost, by anything that might be done in reforesting the water-shed of the rivers themselves.

In like manner no engineer could honestly advise lowering in height by a single inch the levees of the Mississippi because of any possible application of forestry to the water shed of that stream. And again he could not advise that forestry development would lessen in any degree the cost of improving the rivers for low-water navigation. Engineers fully understand their responsibility in these matters. But great engineering projects cannot be carried out without money, and the people will not give the money unless convinced of the necessity and wisdom of the plan proposed. So long as there is apparently some easier and simpler plan, some panacea, no matter how nebulous or unproven, that offers a way out without the expenditure of so much cold cash, they will be backward in voting money, and the counsel of the engineer will be of no avail. Hence the complete divorcement of forestry from any connection with river regulation—so far, at least, as its effect upon the cost of such regulation is concerned—will be a distinct and positive gain to the latter."

Illustrating further how slight is the influence of the forest upon maintaining stream flow, we find that the snow fields, the natural storage for the mountain streams, lie in California above the elevation 5,000, and in Washington above approximately 3,500 feet.

The timber above these lines is, besides being of poorer quality and inferior size, difficult to cut, and bring to market, so that it is a question as to just what right the forest service has to base a charge upon the benefit it confers upon the power man.

To quote again from the article of Major Chittenden (pages 962-3):

"Let us now inquire if it will not be to the advantage of this great work to be absolutely independent of any connection with waterway development. Will it not be better in every way for forestry if it is promoted solely on the basis of producing trees for human use and enjoyment, and not at all for the supposed influence upon flow of streams? Is it really a wise move, so far as forestry is concerned, to single out the rugged and inaccessible mountains as localities where our future supply of timber must come from? The availability of forests to human needs depends very largely upon the situation in which they grow. Few people understand the exceeding importance of this matter. The converting of a forest tree into form for use involves two distinct processes, the conversion of the tree into lumber or other product and its transportation to the place of consumption. The cost of logging operations is immensely increased by the roughness of the ground. In our Western forests, for example, it requires a higher grade of skill, commanding higher wages, to 'lay' a tree on a steep hillside than on even ground. The losses from breakage in falling are much higher, and the difficulty and expense of getting the logs out much greater. In fact, the increase of cost runs all the way from $1 to $10 per 1000 depending upon the situation. 'Engineering News' stated the case very forcibly in regard to the Appalachian forests (though it did not have this particular thought in mind), when it said in a recent issue that 'the cutting off of forests on the remote mountain slopes has only become possible with the high price of lumber that has prevailed for ten years past.' This increase of cost represents the perpetual tax that the public must pay for timber from these regions as compared with that from the lowlands. And a great deal of it can never be gotten out at all. The poet's 'gem of purest ray serene' was not more lost to human needs than are tens of thousands of noble trees in the rugged fastnesses of our mountains, east and west. Benefit? To convert them into lumber will cost more than they are worth. Enjoyment? Only the solitary hunter or mountaineer ever sees them. These are not the places to rear up forests for the good of the people."

44. As indicating the advance in California due to water power being distributed over the State and sold at a cost considerably lower than other power could be produced in any other way: local cements are sold at $1.60 per barrel. Other cements cost 50 per cent to 100 per cent more. This cheap cement has had a great influence in construction generally. Moreover, the mines at Grass Valley and on the Mother Lode were at a standstill until cheap power was made available. A most striking case of this is shown by the operations at the famous Comstock mines in Nevada, which produced $600,000,000 in gold since they were opened. The mines on reaching a depth of over 2,000 feet struck a large flow of water, which it was found impossible to pump with the old type steam pumps. Electrically driven pumps are now used and the mines are being unwatered, and it is expected ultimately that the rich rock will again be brought from the mines. The monthly cost of these mines of operating electrically driven pumps is now $8,445, as against $58,000 for the old pumps. For these mines many thousand square miles of timber for power were cut off, but with the introduction of electric power the area cut over is again reproducing a new growth.

45. In many districts in California, as in other Western States, it is impossible to bring water to the land for irrigation by gravity at a reasonable cost, and electrical pumping is resorted to with great benefit to the farming and general population in many instances.

46. In the Sacramento Valley there has been constructed, and is being operated, an electrical railway running through the most fertile section. This road would not be possible were power at the former high price. The farmers and the general community here again reap a great benefit from an industry made possible by water power.

47. The copper mines of Shasta County and the dredgers of Oroville and Marysville depend on electric water power; these interests could not afford to pay for steam power. Many examples may be given, but these suffice to show that the people of the districts, the counties, the States, and the United States are all influenced by the price of power in proportion as they are near the supply. The water powers should not be taxed except by the State, and the title to property and rights of way should not be revocable at the whim of some government official.

48. My suggestion for a water policy would be as follows:

1. Make property and rights of way permanent, or fix the term for at least fifty years and give some basis for renewal, on condition that a certain proportion of the development be completed in five years.

2. The power plants are to pay a conservation charge based on the minimum run-off of the stream, said charge to be based on cost to United States Government of the conservation.

3. Reserve the right to impose a tax to the States.

49. By thus separating the problem we would, I believe, remove at once practically all objections of the power companies and of the bankers and investors, and remove also the objections of those jealous of guarding States' rights.

Conclusion.

50. The people who ultimately support and protect the forests at the present time and preserve them for the future are those who pay for the products of the reserve, that is, the people who buy meat, the people who buy lumber, the people who buy power, the people who buy the products of the irrigated farms, etc. It is right that these people who use the products of the forests should pay for them. All people of the United States obtain the indirect advantage of the forests and can obtain the direct advantage by using the products of the reserves first hand, that is, by helping to develop, support, and protect the forests and the country.

51. To sell the products of the reserves at a high price, in order to yield a large surplus and use the surplus in other States, would be a direct tax on the people of the State or country for those of other States. The people of other States obtain the advantage of the reserves indirectly, as they should, for the reserves will limit largely the price of meat, lumber, and power, and the people of other States obtain the advantage of lower prices for the products which result from the benefits derived from the forest resources. The development of water power especially should be encouraged because by using this waste resource we can reserve our coal, oil, and wood for future use.

52. The entire nation derives indirectly some benefit from California's fruit resources, but we could not operate the State's fruit resources by the United States and tax them by the United States. The entire nation likewise derives benefits from the gold mines of the West, the wheat, corn, and other products raised in the West, yet we would not tax these industries except through the States. To tax them for the general government in order to develop wheat farms in other sections, or to tax Western water powers (as has been suggested) to help develop and rehabilitate "spoiled" and useless water powers of the East, or to tax Western farms to improve those worn out in the East by use or abuse, would be against all principles of taxation in this country, and would be un-American.

53. Similarly the forest reserves belong to the people in trust, and having been withdrawn from entry, and hence the possibility of taxation by the State having been removed, they should be operated *for use and not for profit.* The products of the reserve should be sold at near cost, and, after maintaining, operating, protecting, and extending the forests in any one State, *the profits should be paid to the State and counties in which the forests are located.*

54. The mining man takes from the forests the minerals; the stockman, the grasses; the timberman, the trees; all of which have matured at no cost to them, and no large outlay is necessary before beginning to remove the minerals, the forage, or the timber. The railroad man may obtain a 100 foot right of way, he may use timber, stone, etc., to construct the road, and obtains ground for necessary stations, and all rights are permanent. The power man, on the other hand, takes nothing away from the forest, but makes use of something going to waste, and in doing so must benefit the forest and all the people in the district, because the water power *must* be sold cheaper than other power. A liberal policy can, therefore, be safely inaugurated to develop our waste water powers. He should have permanent rights, similar to those granted the railroad and miner, and be treated as are other interests. The power man must generally expend from $100 to $300 for each horsepower he wishes to utilize before the power can be sold. A 10,000-horsepower plant, therefore, requires the expenditure of from one to three million dollars before any revenue can be derived from the investment.

55. The conclusions drawn resolve themselves into three propositions:

1. The forests can probably be best maintained by United States control as trustee for the States to produce a yearly crop of forage, timber, and water for all time.

2. No profit should be made by the United States Government from the mineral, forage, timber, and water resources, but the products should be sold at near cost by the Government. The prices thus fixed for these products will be as low as possible and the benefits of the reserves will be shared justly by the people who purchase and consume the products in the proportion as they use them. *If a profit is made in any State, that profit should go to the State.*

3. The development of our waste water powers is of greater general benefit than any other development, because this will make use of resources now going to waste, reserve the coal, oil, and wood supply, reduce the cost of power, and hence the products depending upon power, and equalize conditions by making power available over a large territory.

Finally.

56. The people of the United States generally get the advantage of insurance of the forest products for all time, and in the influence upon the price of the secondary products, such as meat, lumber, and the products of factories requiring cheap water power, etc. This general insurance and influence on prices is probably sufficient justification for the operation of the forests as a whole by the United States Government, and, if operated by the United States as the agent of the States and all profits turned over to the States, in lieu of loss of taxes, it is believed no individual or interest, State or county, could find any reasonable objection to the perpetual operation of the forests by the United States Government. It allows each district, county, and State to develop along the line of its natural resources and its position, which is the only logical method. The States, the various interests, and each individual should, as far as possible, develop on merit. To tax one section against another, or to tax one interest for the benefit of another, or not to allow industry, progressiveness, and individuality to have their reward, would be illogical, unfair, and un-American.

57. By allowing each district, county, and State to develop along its natural lines, all opposition to the operation of the forest reserves by the United States would disappear, and the local people would support the policy. By recognizing that each industry should support itself, and by making charges reasonable and logical, the various interests will support the policy. By allowing industry, progressiveness, and individuality to have their reward, there should result a spirit of co-operation which should result in great good and eliminate many of the unpleasant features of the present conditions, and result in *development and use, as well as conservation, of resources.*

CIVIL SERVICE EXAMINATION.

The United States Civil Service Commission announces an examination on December 2-3, 1908, to fill vacancies as they may occur in the position of junior engineer in the technologic branch of the Geological Survey, at salaries ranging from $840 to $1,200 per annum. Temporary appointments to the position of engineering aid or apprentice may also be made from the list resulting from this examination of those receiving a rating between 60 and 70, at salaries ranging from $600 to $780 per annum. The examination will consist of elementary chemistry, physics, and mathematics; essay of not less than 500 words on one of the following subjects (both English composition and drawing will be rated on this subject): (a) On a civil engineering subject, accompanied by drawings; (b) on a mechanical engineering subject, accompanied by drawings; (c) on a mining engineering subject, accompanied by drawings; mechanics and dynamics of engineering; engineering special subjects: (a) testing of structural materials, with outline of necessary observations and computations; (b) testing of fuels, with outline of observations and necessary computations; (c) mining operations, including tunneling, blasting, hoisting, ventilation, shaft sinking, etc. (Ten questions will be given under each subject

SUMMARY OF PROCEEDINGS, SIXTEENTH ANNUAL CONVENTION OF THE PACIFIC COAST GAS ASSOCIATION, SANTA CRUZ, CAL., SEPTEMBER 15, 1908.

REPORT OF BOARD OF DIRECTORS.

Your Board of Directors, to whom was referred the report of the secretary and treasurer, beg to report that, after an examination of the same and the vouchers in connection therewith, they find it in order, and all expenses properly accounted for. It also approves of the election to membership of the several applications on file as listed in said report.

In the matter of the application of the American Gas Institute for amalgamation by this Association, your directors are of the opinion that for territorial reasons, it would be detrimental to the interests of the gas companies on the Pacific Coast to surrender peculiar privileges which are enjoyed in the maintenance of the entity of the Pacific Coast Gas Association, and while desirous of aiding and assisting in every way the American Gas Institute, feel impelled to decline the invitation of Mr. Alexander C. Humphreys, and request that through the secretary, the Association be so advised.

In the matter of delinquent members referred to it, it begs to recommend that all members who are more than one year in arrears for dues be suspended, discretion being vested in the secretary to carry upon the roll, such members who are delinquent and from whom it may be possible to make collection at some future time.

In the matter of the invitation of the Yukon-Alaska Exposition, deem it unwise to hold meeting of the Association other than at central points in California, and in that connection recommend that the session of 1909 be held in the city of San Francisco.

We recommend the adoption of the following resolutions:

Resolved, That the Pacific Coast Gas Association determines that in the matter of pressure which should be allowed at inlet of consumers' metors, that same should not be restricted in any way as to maximum, but that a minimum pressure only should be specified. Years of experience with high pressure distribution in California, demonstrating the fact that much better results for both consumer and company are obtained by excesses of normal pressure and that no danger to the consumer, either from excess consumption or from possible damage to interior fittings will result by pressure as high as fifteen inches.

R. L. CLARK,
W. F. BOARDMAN.

NEW MEMBERS ELECTED.

Regular.

R. J. Cantrell, property agent, Pacific Gas & Electric Co., San Francisco, Cal.

Roscoe Hazard, wholesale gas appliances, San Diego, Cal.

A. S. Hockenbeamer, treasurer and comptroller, Pacific Gas & Electric Co., San Francisco, Cal.

Leon B. Jones, assistant engineer, gas department, Pacific Gas & Electric Co., San Francisco, Cal.

W. H. Kline, tax agent, Pacific Gas & Electric Co., San Francisco, Cal.

W. R. Morgan, superintendent gas distribution, San Francisco Gas & Electric Co., San Francisco, Cal.

R. L. Van der Naillen, manager, Oro Light, Water and Power Co., Oroville, Cal.

Don C. Ray, assistant manager, Nevada district, Pacific Gas and Electric Co., Grass Valley, Cal.

Frank E. Russell, manager, Tucson Gas, Electric Light & Power Co., Tucson, Ariz.

Samuel Carson, superintendent Metropolitan Light & Power Co., San Francisco, Cal.

P. J. Douglas, foreman Suburban Light & Power Co., San Leandro, Cal.

U. N. Davidson, gas appliances, 327 Grand Avenue, Oakland, Cal.

Associate Members.

Vallejo Gas Co., Vallejo, Cal.
Godfrey Fritz, Los Angeles, Cal.
McCormick, Henderson Co., San Francisco, Cal.
C. O. D. Blanchfield, San Francisco, Cal.

DISCUSSION OF PAPER ON "MODERN METHODS OF HEATING."*

John A. Britton: To me this paper is a reminiscent subject. No doubt a great many of you recollect the first gas stove that was introduced by gas companies in California. Looking back thirty odd years, when the old Fletcher stove was brought from England, that weighed portions of a ton, and had to be lifted by a derrick into the house, down to the present heater, is a long stride that the gas men have gone through. The pioneering of fuel gas was probably the greatest effort of the gas man's life, and we owe it to the electric lighting men that we are alive today. I think we were all Rip Van Winkles, asleep on the mountain side, satisfied with our prosperity at the time, and when we began to see our consumption and consumers lessening, we were moved to some action to retrieve our falling fortunes. I want to recall what I said before in these meetings with reference to what was practically the pioneering of the gas stove industry in the United States—there was an old man named Cushing in San Francisco, who had a little foundry on First Street, between Market and Mission Streets, by whose doors, Mr. Jones, no doubt, passed many and many a day, and Cushing was one of those genii that needed a series of dynamite bombs under him to get him into action. I was one of those dynamite bombs, and succeeded in urging Cushing into the manufacture of gas stoves. Patterned in the beginning something after the English stove, although not so massive in construction, with an oven burner of perforated pipe, most ineffective, but it did its work. It was the means of introducing the commodity to the people. I think the Oakland Gas, Light & Heat Company or the Oakland Gas Light Company, as it was called then, was about the first company on the Coast to introduce gas for fuel purposes, and in 1880, if my memory serves me rightly, we had Cushing make us a consignment of stoves. They were about the same as the little No. 7 Eclipse stove that you are all familiar with. It has four burners on top and two ovens. We were selling gas at four dollars ($4.00) per thousand at that time, and in order to encourage the use of fuel gas we reduced the price to $3.75 per thousand. We were the only company that I know of in the State that made a different rate for fuel, and it has been gradually reduced, until it is now sold for ninety cents per thousand for fuel, and one dollar for illuminating. It seems to me that the water heaters have really done more towards the use of gas for domestic and commercial purposes than any other heaters that I am aware of.

If you will have the patience to look back on the records of the Association, I will call your attention to a statement made by me, I think some eight or nine years ago, may be ten years ago, when I mentioned an installation that had been made in Oakland for a shirt factory, wherein we sold gas at that time, I think, at $1.75 per thousand. We guaranteed Mr. Keller, for whom we installed the heater, that we would maintain steam in his boiler at a constant temperature of eighty pounds, and provide him sufficient steam to do all of his laundry work that he had been doing with coal. He moved to a building where he located on the third floor, and where he could not get permission to maintain a coal-fired steam boiler, and so, in

*See page 248, issue October 17, 1908, Journal of Electricity, Power and Gas.

desperation, he appealed to us. I designed a burner at that time, which afterwards was the foundation of a water heater, made in San Francisco, and which was put in the boiler, and for years maintained steam for Mr. Keller at a cost equivalent to about $3.00 a ton for coal under eighty pounds pressure constantly. The installation was never duplicated, but it was really the forerunner of all the uses of gas for boiler heating. The Oakland company has ever since been in the foreground when it comes to the utilization of gas for purposes of that kind. We have two or three men in our employ in Oakland, who have been there for a great many years, that are genii in that particular line.

You can all remember when your fuel sales were possibly five or ten per cent, while today, they probably run from sixty to seventy per cent of your total output.

The successful water heater has solved one of the great domestic problems. Of course, we can say that a great deal of its success is due to the low rate at which gas is now sold in comparison with former years. Ten years ago an appliance of this character would have been prohibitory. No one could have afforded to pay the cost of $2.50 per thousand as against the price of other solid fuels, but the cheap rate now prevailing makes these appliances possible.

There is one thing I want to say in closing. It seems to me that the manufacturers of these appliances are more derelict than the gas companies or managers of the gas companies, in that they do no missionary work to help their goods. They expect the gas man to bear the brunt of the introduction of the appliances. They expect him to pay out of the money for solicitation for free services, enlarged services or enlarged meters. Now, if the appliance company would put out drummers, commercial men, as any other mercantile industry does, and make it a point to act co-jointly with the gas man, they could accomplish a great deal more. I think if the appliance companies would go into the several fields of California with their own men, they could work up a trade that would be more beneficial to them in the long run than to the gas company, and if they would devote some of the money they spend in sending out elaborate circulars in personal active work in the field, they would soon discover the results in the fruitful interior fields.

I would like to ask Mr. Basford if any figures have been made by him on the basis, for instance, of the rate in San Francisco, assuming 85 cents for illuminating gas and 75 cents for fuel gas, what would the relative cost be for heating an office building, of, say, five or six stories, with 150 outlets?

R. S. Basford: For radiation it is impracticable to handle such a large building. The cost is prohibitive as against solid fuel. The limit in water heating for radiation is a building of about forty rooms; I am speaking now practically. The greatest field for us are small hospitals, small buildings, modern sized school buildings, etc.

H. F. Keyes: I would like to ask Mr. Basford if he knows anything as to the relative cost of heating with hot water system or the hot air system, whether there is any great difference in the cost of heating with hot water or hot air.

R. S. Basford: There is no question but what the hot air is cheaper, if properly fired.

President: I think, gentlemen, from the gas man's point of view, it does not make any difference whether you heat your house with hot air or hot water. Possibly Mr. Fritz can give us some information on this subject.

Godfrey Fritz: I have been a contractor all my life and have never been in the gas business, but a few months ago I became interested in a patented hot air furnace. We claim we can heat a house with hot air more economically than wood or coal, and especially in Los Angeles, as wood and coal are very expensive there.

L. P. Lowe: What are the prices of wood and coal in Los Angeles?

Godfrey Fritz: Very high. About twelve dollars a ton for coal.

John D. Kuster: I am especially interested in the paper on account of the fire engines spoken of. In Fresno we are attempting to get the water heaters started in the fire engines, for which the cost of oil has been about twenty dollars a month. I am anxious to know whether or not they are a success as compared with oil at twenty dollars per month.

R. S. Basford: We had a sad experience in Fresno. After making inquiries, ascertained it burned but five days, when it was pulled out, as it was costing two dollars and fifty cents a day. There was something wrong, and I am going down there in a few days for the purpose of investigating.

DISCUSSION OF PAPER ON "THE HIGH PRESSURE SYSTEM OF THE LOS ANGELES GAS AND ELECTRIC COMPANY."*

E. C. Jones: Mr. President and Gentlemen—I have enjoyed Mr. Luckenbach's excellent paper on high pressure gas distribution in Los Angeles. In our work in various towns, I have noticed an interesting development of high pressure feeding into low pressure districts, and it assumes great importance. We found when we took up the feeding of high pressure gas into low pressure systems that the service would improve and was most excellent, and there is a temptation to increase the high pressure installation at the plant until the gas flows back to the holders, and if we are not careful we find that we are compressing nearly all of the gas and that the gas holders are not doing their share of the work. If great care is not used, as under the conditions of which Mr. Luckenbach speaks, of high pressure feeders leading into a district at some distance from the works with a minimum initial pressure of 13 inches, which is the pressure of his 5,000,000-foot holder. The high pressure will feed back into the district until it meets and increases this 13 inches of pressure, thus adding to the cost of the gas; even the small amount of one and three-quarter cents per thousand for pressure, making it a burden on the gas company. We have had to meet this condition of affairs in several of our towns. In one instance in a very large city, it became necessary to install larger gas fans to increase the initial pressure from the holder, so as to force the high pressure feed gas further out into the district. That establishes what you might call isobaric zones in the district. These isobaric zones should be kept as far as possible away from the distribution holders. To accomplish this result it becomes necessary to take pressures throughout the district from time to time to ascertain if the fans at the gas holders are doing their work or whether they are being assisted by the compressed gas; otherwise, you will be led into an expensive installation, which I consider unnecessary. The establishing of the isobaric zones in Oakland during the last few months has saved us a large amount of money in increased high pressure installation.

President: Mr. Luckenbach, that has not been our experience in Los Angeles, has it, the pressure coming back?

C. A. Luckenbach: Not since the installation of the 5,000,000-foot holder. We previously have had some little trouble in that way.

E. C. Jones: I simply mentioned this matter to save money on high pressure installation. You all know that I am an advocate of high pressure, but I believe in using it with a great deal of discretion.

K. L. Clark: We use the same system in San Diego, but we keep our governors set just a little below the holder pressure.

Concluded Next Issue

*See page 248, issue October 17, 1908, Journal of Electricity, Power and Gas.

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POWER AND GAS

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NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday for the paper dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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A WORD OF APPRECIATION.

In the fire which partially destroyed the Technical Building on the morning of November 4th, the "Journal of Electricity" escaped with a light loss, comparatively, the most serious feature being the inconvenience which results from a sudden and unexpected move, and the work of handling water-soaked records and correspondence.

But disaster also has its bright side, and one of the brightest features was the sympathy expressed and the many warm hand clasps received, the many offers of help and the kind deeds thoughtfully done without the asking. Until better opportunity presents itself, we take this means to express our deep appreciation of these many acts of kindness.

Conservation By Wise Utilization.

In a recent newspaper interview, Mr. Stewart Edward White, a writer of popular fiction, is quoted as saying that "if the country were exploited at all, it had to be exploited wastefully." He had reference to the great waste of natural resources that is inevitable in the development of a new country. Such reasoning may afford a good excuse for the misdeeds of the pioneer past, but it is most certainly fallacious when applied to the present. After a country has been opened up and its resources made available, unless some curb is placed upon their indiscriminate and wasteful use they will soon be exhausted. Hence it is now almost universally admitted that conservation of these natural resources is not only advisable, but also absolutely necessary. As we conserve, so shall we prosper.

But conservation does not mean miserly hoarding. It is only as these resources are wisely utilized that they are of any benefit to the community. As Mr. Frank G. Baum, the hydro-electric engineer, states in this issue, "to conserve the resources without development and use is like putting money in a safe deposit box." One of the strongest points in his subsequent argument is that the development of water power means the saving of coal and oil for purposes where water power is not applicable. There is no thinking man that will long find fault with the principle of conservation.

The policy by which such conservation is effected, however, is one in which there is great variance of opinion. We have hitherto endeavored to present all phases of this question and take pleasure in this issue in again letting Mr. Frank G. Baum express his views.

One novel point which he raises is that forests are not such an important factor in water regulation as is usually supposed. Throughout the great length of the high Sierras, and of Cascade and Rocky Mountains, are hundreds of square miles where the climate is so rigorous that only the hardiest plant life can exist. The mantle of snow that covers their nakedness is the source of most of the water. There are but few hydro-electric plants in the West that do not obtain the bulk of their water for power production from these great treeless areas, and yet these same plants are to be taxed for forest conservation. Furthermore, capital for their development is withheld because of these unsettled conditions.

Yet, recognizing the value of the Forester's good work, the power companies are willing to pay the actual cost of the work. In return, they ask only a guarantee of permanency sufficient to protect capital. They merely request encouragement. Further discouragement means cessation of further water-power development and further industrial decadence.

DESTRUCTION OF THE TECHNICAL BUILDING

At 12:15 on the morning of November 4th, fire broke out on the third floor of the seven-story Technical Building, 111 to 137 New Montgomery Street, San Francisco, wrecking the building.

In the Technical Building were the offices and composing room of the Technical Publishing Company, the offices and warehouses of the Standard Electrical Works, Henry F. Frosch Company, the Van Emon Elevator Company, and Otis & Squires. The building was entirely gutted above the second floor, while the first and second floors and basement were flooded with the tons of water thrown into the building by the fire department.

Technical Building, San Francisco, Destroyed by Fire, November 4, 1908

The fire was of a most spectacular nature, and when it eventually broke through the roof, it illuminated the entire business section of the city. The fact that it was election night, the streets being filled with people, brought a tremendous throng, which the police found great difficulty in restraining.

In fighting the fire, two firemen were seriously injured, and their removal to the hospital was necessary. Volunteers were called to cut the high tension wires leading across the roof into the air shaft, and thence into the testing room of the Standard Electrical Works. It was while engaged in this work on the upper balcony of the fire escape on the front of the building that a cornice fell, burying them under a mass of debris.

The "Journal of Electricity" and the Henry F. Frosch Company, who represent the Federal Sign Company, the General Incandescent Lamp Co., and the Crescent Co., are temporarily located at 155 New Montgomery Street. The Standard Electrical Works are temporarily located at 141 New Montgomery Street. Otis & Squires are at 645 Howard Street, corner of Hawthorne. Companies represented by them are as follows: The H. Krantz Manufacturing Company, Columbia Incandescent Lamp Company, L. B. Allen Company, Knoblock, Heideman Manufacturing Company, Machado & Roller, the Woolley Electric Company. The Van Emon Elevator Company are at 54 Natoma Street.

Work of reconstruction of the building is now under way, and it is hoped that it will again be ready for occupancy by January 1st.

ELECTRICAL CLUB

The meeting place of the Electrical Club, recently formed in San Francisco has been changed to the Hotel Argonaut, on Fourth Street, near Market. Lunches are held at one o'clock every Saturday afternoon.

PERSONALS

J. W. White, of San Francisco, has joined the engineering staff of the Fort Wayne Electric Works, with headquarters in the Atlas Building, San Francisco.

Henry T. Scott, President of the Pacific Telephone and Telegraph Co., San Francisco, accompanied by Mrs. Scott, returned on November 2nd from a trip through the East.

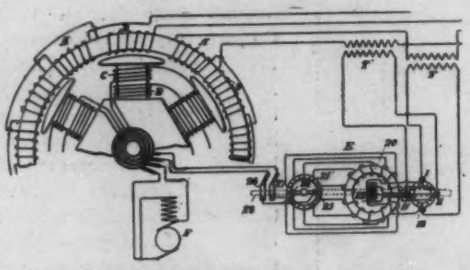
Fred F. Skeel, Western representative of the Crouse-Hinds Manufacturing Company, Syracuse, is, we understand, on his way to the Coast. His numerous friends in this section will be unusually glad to see him again and receive further information regarding the high quality of his well known line of condulets.

H. H. Sinclair, E. E., vice-president of the Edison Electric Company, of Los Angeles, spent the past week in San Francisco.

A. S. Merrill, representing the Chicago Fuse Wire and Manufacturing Company, Chicago, is in San Francisco in the interests of his company. This is Mr. Merrill's maiden trip to the Coast. Like all Eastern visitors his impression is an exceedingly favorable one, and he has almost reached the point of investigating the price of real estate. He has made many friends during his visit here, who will look forward to future visits of the same character with a great deal of pleasure.

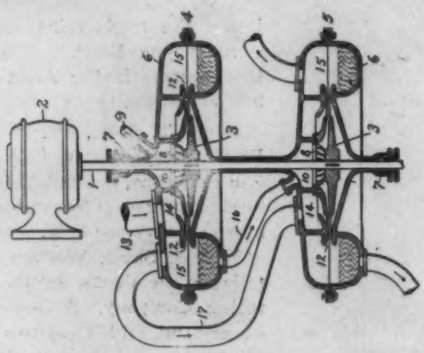
PATENTS

ALTERNATING ELECTRIC CURRENT MACHINERY. 901,341. Alexander Heyland, Brussels, Belgium.



Means for compounding alternating current machines comprising a conductor carrying the main current or a current proportional thereto, a commutator for simultaneously commutating and decomposing current, connected to conductor, a field winding, winding being connected to commutator in such manner that two groups of circuits, differing between themselves by a quarter of a period, are formed whereby main current or current proportional thereto, is decomposed into its two components, the watt current and the wattless current, and brushes bearing upon commutator in such position that the wattless component traverses field winding in a given constant direction, while the watt component is led away through the circuits that differ by a quarter of a period from field winding, or traverse various parts of the pole winding in opposite directions so that it exercises no magnetizing effect in field winding.

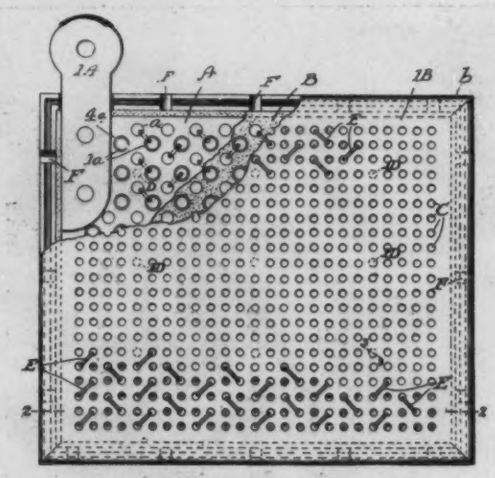
MULTISTAGE CENTRIFUGAL PUMP. 901,450. Huldreich Keller, Berlin, Germany, assignor to General Electric Company.



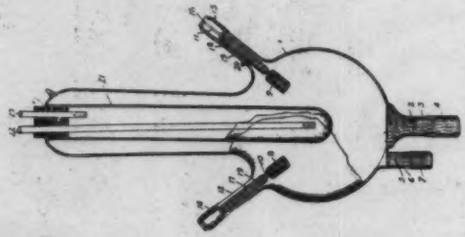
In a device of the character described having a series of pumps or stages, the combination of a conduit supplying active fluid to the first pump or stage, a conduit supplying a less dense fluid to stage to be compressed or condensed by the active fluid, means for passing active fluid from one stage to the next, means for conducting the fluid acted upon from each stage to the next so that the less dense fluid is successively acted upon by the same body of active fluid, and means for driving the device.

ELECTRICAL ACCUMULATOR. 901,322. Charles Busch, New York, N. Y.

In an electrical accumulator element, a perforated electrode, a paste upon the surface of the electrode, a sectional casing for the electrode, perforations in the casing and an elastic binder strung through the perforations of the casing and the perforations of the electrode to maintain the sections in contact with the electrode.

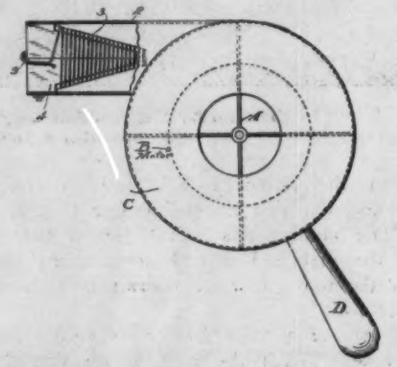


VAPOR ELECTRIC APPARATUS. 901,427. Leonard E. Dempster, Schenectady, N. Y., assignor to General Electric Co.



The combination of an envelop or container, an electrode therein, a current conveying conductor for electrode, and a protecting sleeve for conductor consisting of vitreous material having metal in an elongated shape embedded therein.

ELECTRIC HEATER AND DRIER. 901,871. George N. Blanchard, San Francisco, Cal., assignor of one-half to The Electric Manufacturing Co., San Francisco, Cal.



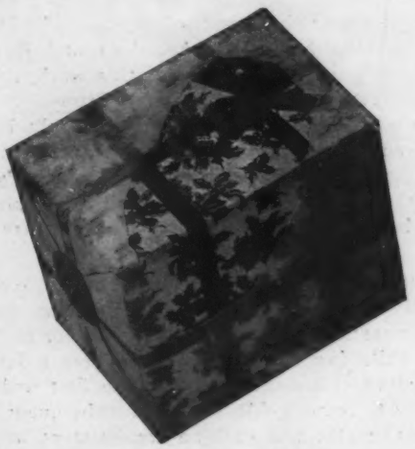
In an air-heating apparatus, an air-forcing mechanism, a discharge tube, and a pyramidal electrical resistance coil fixed within tube. In an apparatus of the character described, an air discharge passage, consisting of wires wound upon a divergent or pyramidal insulated frame, located in discharge tube.

INDUSTRIAL

SOMETHING DIFFERENT FOR CHRISTMAS.

Those who like to surprise mother, wife, or sister with a Christmas present that is out of the ordinary will find something entirely different in the line of Christmas packages put up by the Westinghouse Electric & Manufacturing Company, containing useful electrical appliances. These packages are wrapped in handsome holly paper and tied with red ribbon, and then rewrapped in transparent paper through which the colors are visible.

Such articles as the sewing-machine motors, sad irons, and electric hot plates or stoves in two sizes are put up in this manner.



Westinghouse Christmas Package

Each package carries an appropriate card and label conveying the wishes of the season and provided with a space in which the donor may write his name and the name of the party for whom the package is intended. They will present a handsome appearance upon the shelves of the dealer or in the show window. They are packed for shipment in such a manner as to protect the wrapping from damage.

This line of Christmas goods presents a very favorable opportunity to the central station to introduce electrically operated household devices to their customers, and the substantial character of the Westinghouse apparatus makes it particularly desirable for this purpose.

At the same time, such articles put up in this manner enable one to give something useful without sacrificing the cherished Christmas traditions of holly, red ribbon, and surprises so dear to every woman's heart.

Most ladies would undoubtedly be glad to open such a box and find it to contain an electric iron, for instance, instead of candy or flowers. Such presents designed to make the household duties more pleasant, will be a reminder of kind Christmas wishes throughout the year and for years to come.

NEW HOLOPHANE REFLECTORS FOR TUNGSTEN LAMPS.

The Holophane Company has just completed the designs for an entirely new line of reflectors for tungsten lamps. These reflectors are not only more efficient than old styles, but a number of remarkable improvements have been incorporated in their design which even the Holophane Company's engineers have heretofore considered unattainable. The reproductions here published are characteristic of all these reflectors.

The new tungsten reflectors are of three types, which will be known to the trade as the extensive, intensive, and focusing types. In appearance all are similar to the original "bowl type" Holophane reflectors designed for Gem lamps, but each of the three new types above named gives a very distinctive distribution of light. The extensive gives an improved bowl type distribution; the intensive, a good general distribution downward; while the focusing type is a strong concentrator. The reflectors were designed to fit the requirements of modern store, office, and hall lighting, and so fully do they serve the purpose intended that illuminating engineers are on record as stating that they have almost ideal photometric curves. In the preliminary engineering work connected with these new types, the engineering department, Holophane Company, was ably assisted by Mr. A. J. Sweet, of the Westinghouse Company.

Focusing Holophane Reflector

In the designing of the reflectors an entirely new principle was evolved, that of the "merging prism." As is well known, Holophane reflectors having a continuous prism from the collar to the edge lose considerably in efficiency, owing to the fact that the prism is much larger at the bottom than at the neck. To prevent this, the Holophane Company designed what is known as the "equal prism" reflectors, in which prisms of practically equal size are run in several banks from neck to top. In the new types, instead of an abrupt step between the banks of prisms, the several banks are merged one into the other, which not only adds greatly to the beauty of the reflectors, but at the same time gives the maximum of efficiency.

Extensive Holophane Reflector

The new "merging prism" reflectors are made for 40, 60, and 100 watt tungsten lamps, three types, as above described, for each size of lamp. This makes a very compact line and one which is uniform in appearance.

The new Holophane bulletin No. 11, descriptive of this line of high-efficiency reflectors, is now ready. In addition to technical description, photometric curves, etc., this bulletin contains a few simple rules, by following which even a novice may be sure of selecting proper size of lamps and correct Holophane reflector, and of spacing these rightly in any ordinary lighting installation. The new "flux-of-light" method of

Intensive Holophane Reflector

calculating illumination enables the Holophane Company's engineers to reduce the salient features of practical illuminating engineering to a few simple "rules of thumb," which are applicable wherever the installation is not complicated by esthetic or architectural difficulties or restrictions. The new line will be handled not alone by the Holophane Company, but also by the General Electric Company, Westinghouse Company, Franklin Company, and the companies comprising the National Electric Lamp Association.

CONVENTION OF NATIONAL COMMERCIAL GAS ASSOCIATION.

The officers and directors of the National Commercial Gas Association announce the next annual convention of the organization to be held at Chicago, December 8th, 9th, and 10th, in the First Regiment Armory, Michigan Avenue and Sixteenth Street. Sessions 10 a. m. to 2 p. m. of each day. Coincident with the meeting and throughout the week the association is to hold its annual exhibition of gas appliances, detailed announcement of which is made by the committee of arrangements in Chicago, of which Mr. John C. D. Clark, 157 Michigan Avenue, Chicago, is chairman.

The association further announces the co-operation in its exhibition feature of the American Gas Institute, from which body three committeemen were invited by the association to act upon its exhibition committee of seven.

This portion of the general program is sufficient to insure valuable return for the time investment in attending; add, however, the vast exhibition feature and the association offers to the gas men of the country otherwise unequaled facilities for comparing by viewing, learning by hearing, and knowing by meeting.

COMPLETION OF THE SHANGHAI ELECTRIC STREET RAILWAY SYSTEM.

According to Vice-Consul-General Frederick D. Cloud, of Shanghai, the advent of the horseless and engineless cars, moving smoothly up and down the crowded streets, occasioned no end of surprise and wonder on the part of the native population. In some quarters there was, while the tracks were being laid, considerable hostility manifested against the whole scheme of having street cars in Shanghai, because of the fear that a large class of men would be deprived of their livelihood. The concession for the building of the lines was granted to a Scotch company in 1905, and by that company transferred, with the consent of the municipal council of the international settlement, to another construction company on condition that the obligations of the original concessionaires should be carried out. According to the franchise the concessionaires were to build twenty-four miles of railway. The franchise is given in perpetuity, but at the end of thirty-five years, or at the end of any subsequent seven years, the municipality may purchase outright the whole of the company's interest therein.

The rails, which are of British manufacture, are of the grooved girder pattern, weighing ninety pounds to the yard, and the gage is one meter (39.37 inches), the narrow gage being used on account of the narrowness of the streets. Two steel bridges were thrown across the creek which runs through the heart of the settlement, adding greatly to the comfort and convenience of the public. These bridges were built by an English company at a cost of $117,951 for the steel work alone, the foundation work having been constructed by the engineers of the municipality at an additional cost of $288,750. While there were American and German firms among the original competitors for this work, the contracts were let, without exception, to British firms.

The cars for the entire system were built by a British company, and, while fairly comfortable and apparently well built, are not of a strictly up-to-date pattern. By reason of the gage the cars are narrow and small, a complete carriage weighing but ten tons. The driving platforms are very small and open.

The routes are divided into sections. A section is approximately one mile in length. For first-class passengers a fare of five cents Mexican (2.1 cents gold) for each section is charged, while for second-class passengers a fare of three cents Mexican (1.3 cents gold) for the first and two cents Mexican (0.8 cents gold) for each subsequent section is charged. The object of such an arrangement was to induce the Chinese population to patronize the cars by giving them a cheap fare, and to induce foreigners to pay the higher rates by providing them separate compartments. It was also thought that unless some such tariff scheme was adopted, the foreign population would not patronize the cars; yet on all the routes, except at the busiest hours of the day, the first-class compartment is practically deserted. So universal has become the use of the second-class compartment that only ten per cent of the daily revenue comes from first-class passengers, and as the first-class is double the second-class fare, it means that out of a total of 38,000 passengers carried daily only about five per cent of them travel first-class.

The operation of tramways in Shanghai is beset with rather unusual difficulties. The motormen and conductors are of necessity Chinese. It is doubtful if any other city in the world presents such a conglomerate street traffic on such a large scale as does Shanghai. During the busy hours of any week-day upon the main thoroughfares may be seen heavy hand-carts loaded with a ton or more of merchandise, each drawn by ten or twelve coolies; wheelbarrows heavily laden with freight or passengers (sometimes as many as twelve persons ride on one wheelbarrow), dodging hither and thither in an effort to avoid collisions with faster vehicles; numberless rickshaws running pell-mell, bicycles and motor cycles with bells ringing, and motor cars and public and private carriages endeavoring to pass everything on the street. When to this surging mass of people, horses, and every kind of vehicle, is added a double-track street railway, running down the middle of the streets that in some places are less than twenty feet in width, one is able to realize something of the difficulties encountered in maintaining an efficient street-car service. The difficulties of operation, however, are gradually growing less as the native employees become more experienced and as the public grows accustomed to the new means of transportation.

NEWS NOTES

WATERWORKS.

OAKLAND, CAL.—The Healy-Tibbets Company, of San Francisco, has been awarded the contract for the construction of the proposed salt water pumping plant station on the shores of Lake Merritt on its bid of $21,830.

YUBA CITY, CAL.—The Town Trustees announce that bids will soon be called for the furnishing and erecting of a steel tower and steel water tanks for the proposed municipal water system.

LOS ANGELES, CAL.—The Board of Water Commissioners will on November 16th open bids for 4,990 feet of riveted sheet steel pipe according to specifications. The pipe is for use in the Owens River water system.

LOS ANGELES, CAL.—The Clare Consolidated Gold and Copper Mining Company will lay a pipe four miles long in order to bring water from the Colorado River to the site of the proposed new town of Swansea.

OIL.

REDONDO, CAL.—The Tidewater Oil Company, recently incorporated here with a capital stock of $50,000 will soon begin sinking a test well on the Bixby Ranch, two and a half miles south of this place.

COALINGA, CAL.—The railroad company has failed to supply the full number of cars needed by the oil shippers here during the last month. An average of twelve cars per day and a shipment of 86,400 barrels per day has been kept up, but this has restricted the shipments by about 14,000 barrels per day.

LONG BEACH, CAL.—The Standard Oil Company has been granted permission to erect a steel crude oil storage tank at West Long Beach.

FINANCIAL.

SAN FRANCISCO, CAL.—The gross earnings of the San Francisco, Oakland and San Jose Railroad Company for the month of September, increased $1,835 as compared with the same month last year, the operating expenses increased $1,304, the net earnings $531, the fixed charges $2,337, the surplus decreased $1,805. For the nine months ending September 30, the gross earnings increased $78,344, the net $55,701, and the surplus $47,792.

SAN FRANCISCO, CAL.—The gross earnings of the Oakland Traction Company for the month of September as compared with the same month last year, show a decrease of $12,916, the operating expenses a decrease of $11,976, the net earnings a decrease of $939, and the surplus a decrease of $125. For the nine months ending September 30, the gross earnings increased $23,946, the operating expenses decreased $54,597, the net earnings increased $78,544, and the surplus increased $59,131.

SAN FRANCISCO, CAL.—The Marin Water and Power Company has issued a deed of trust in favor of the Mercantile Trust Company, of this place, as security for the remainder of the company's issue of $2,000,000 in bonds. The proceeds of the bonds are to be used in developing the Marin Water and Power Company's plans in Marin County.

LONG BEACH, CAL.—The City Council has passed an ordinance calling a special election to be held December 15th to decide on the proposed issue of bonds to acquire the plants and systems of the Alamitos Water Company and the Long Beach Water Company. The price asked for the former is $251,000, and for the latter $497,000.

SAN FRANCISCO, CAL.—In a circular issued by the Associated Oil Company to its shareholders, it is announced that the 6,286.78 shares of the company's stock recently offered to the shareholders which was not taken by them, has been sold for $30 per share. The total proceeds from the sale of the 102,630 shares offered was $2,597,184.

MILL VALLEY, CAL.—The City Trustees of this place have sold to N. W. Halsey & Co. the issue of $50,000 in bonds for municipal improvements recently offered. The bidders for the bonds offered the following premiums above par and accrued interest: Halsey & Co., $2391; G. G. Blymyer & Co., $2025; E. H. Rollins & Son, $2086; Los Angeles Trust Company, $1510; W. R. Staats & Co., $728.

SAN FRANCISCO, CAL.—The ordinance calling a special election to vote on an issue of bonds to cover the preliminary expenses for the proposed Sierra water system was finally passed by the Board of Supervisors last week.

SAN FRANCISCO, CAL.—The United States Circuit Court has amended the temporary injunction restraining the municipality and the consumers of the city from attempting to enforce the ordinance fixing the gas rate, by ordering the company to pay into the court all the excess collected above the amount fixed by the ordinance.

INCORPORATIONS.

SAN FRANCISCO, CAL.—The Southeastern Oil Company has been incorporated here with a capital stock of $500,000. The directors are Charles G. Wilcox, Louis Nathan, T. N. Davidson, C. A. Mielenz and M. L. Euphrat.

FRESNO, CAL.—The Great Divide Oil Company has been incorporated here with a capital stock of $500,000 by L. L. Herbert, of Los Angeles; J. J. Grimmer, L. Samuels, L. R. Eccleston, and S. J. Watkins.

SAN FRANCISCO, CAL.—The Clear Lake and Southern Railroad Company has filed notice of an increase in its capital stock from $3,500,000 to $10,000,000. At a recent meeting of the Board of Directors Kent J. C. Seymour was elected president of the company.

FRESNO, CAL.—The Coalinga Hub Oil Company has been incorporated here with a capital stock of $200,000 by W. M. Dunham, E. H. Fallen, B. M. Bussey, F. M. Nevins and F. Bennett.

LOS ANGELES, CAL.—The El Molino Terrace Land & Water Company has been incorporated here with a capital stock of $50,000 by F. C. Platt, R. J. Baird, and I. G. Platt, of Pasadena.

LOS ANGELES, CAL.—The Lookout Mountain Park and Water Company has been incorporated here with a capital stock of $500,000 by R. K. Tabor, A. B. Salisbury, A. W. Curby, G. M. Griffin, and W. B. Salisbury.

FRESNO, CAL.—The Wahtoka Water Company has been incorporated by G. W. Anderson, J. Q. Anderson and Calvin Bearson, of Fresno, and W. N. Rohrer and L. B. Carey, of Reedley, with a capital stock of $19,600.

STOCKTON, CAL.—The Stockton and Terminals Railroad Company has been incorporated with a capital stock of $600,000, of which $29,000 has been subscribed by J. E. Adams, and $800 each by W. H. Newell, A. A. Grant, M. J. Congdon, E. F. Davis, S. L. Steidley, Robert F. Burns, and R. V. Dixen.

OAKLAND, CAL.—The California Monorail Company has been incorporated here with a capital stock of $500,000 by J. M. Adams, R. A. Gerdes, J. M. Crist, and W. J. Skinner.

TRANSMISSION.

QUINCY, CAL.—H. O. Lague, of Reno, Nev., has been here perfecting plans for a large electric power plant which he states that himself and others will soon erect on the Feather River. Mr. Lague recently filed claims on 60,000 inches of water in Feather River.

SAN FRANCISCO, CAL.—The report has been given by one of the local papers that an agreement has been reached between the Pacific Gas and Electric Company and the Great Western Power Company, by the terms of which the former company will buy and distribute all the power developed by the Feather River plant of the Great Western Power Company.

YREKA, CAL.—Erickson & Peterson have completed a powerhouse and plant at Dorris to develop power for mining purposes.

MANHATTAN, NEV.—F. B. Mechling, a representative of the California-Nevada Power Company, is here securing contracts for power. He states that it will cost his company about $90,000 to bring its transmission line to this place, and Mr. Mechling wished to see whether or not sufficient business can be secured to justify the expense.

MODESTO, CAL.—The La Grange Water and Power Company has been awarded the franchise recently asked for for a distributing system in this place.

PHOENIX, ARIZ.—The Southwestern Sugar and Land Company has announced plans for the erection of a power plant of 150 horsepower at a point eighteen miles from Phoenix on the Agua Fria River.

SPOKANE, WASH.—D. L. Huntington, general manager, announces that on order has been placed with the I. P. Morris Company, Philadelphia, for four wheels, each 30 feet in diameter, and capacity of 9,000 horsepower, with a head of 68 feet of water. They are to be completed in fourteen months, and will be installed in the new works at Little Falls, on the Spokane River. The first unit will be delivered September 1, 1909. The plant at McCall's Ferry, Pa., is the only one on the continent having larger wheels.

SANDPOINT, IDAHO.—Jerome L. Drumheller, of Spokane, and his associates, are working on plans to develop Mozie Falls, in Mozie River, Idaho, to transmit power to Sandpoint, Idaho, for manufacturing purposes. The falls will develop 8,000 horsepower, and it is planned to send this over a high tension line. Other towns in the Pend Oreille district may be served later.

TRANSPORTATION.

SEATTLE, WASH.—Announcement is made that electrically propelled passenger trains will be running through the Cascade tunnel in Central Washington before January 1. Turbines and transformers to develop 12,000 horsepower, are assembled at Leavenworth, ready for installation. The wood stave pipe line which is to carry a considerable portion of the Wenatchee River to the turbines is 10,950 feet in length and eight feet six inches in diameter inside measurement. It is the largest job of its kind ever undertaken in the northwest. Eight locomotives have been ordered for pulling trains through the tunnel.

OAKLAND, CAL.—The California Door Company has secured an injunction against the Key Route railroad system restraining the railroad company from laying its tracks on Wood Street near the plant of the door company.

SAN DIEGO, CAL.—The Mayor has signed the ordinance awarding to the Point Loma Railroad Company a franchise to the Ocean Beach.

GOLDFIELD, NEV.—The County Commissioners have awarded franchises for electric street railways in Goldfield, Diamondfield and Columbia to the Goldfield Traction Company, which is supposed to have the backing of George Wingfield and others. Work on the new line is to commence at once, and at least one mile of the company's line must be complete and in operation by the end of next June. The maximum rate for carrying passengers within the limits of Goldfield is to be fifteen cents, and between Goldfield and Diamondfield, thirty cents.

SPOKANE, WASH.—Jay P. Graves, president, announces that the company has no intention of giving up its franchise to build a tunnel through the city. It is stipulated that work begin next February, and the company has three years in which to have one track in operation. The tunnel will be in Front Avenue, and will cost $1,000,000.

SPOKANE, WASH. — Commissioners of Spokane County will be asked in a short time to grant a franchise for the extension of the Sprague Avenue line from the eastern city limits to Opportunity and Vera, Wash. The company now operates to a point beyond the Spokane Interstate fair grounds, and has been given a franchise to the east city limits in Sprague Avenue. The continuation of this line is to be one of the first improvements for the extension of the city system.

EPHRATA, WASH.—O. A. Kuck, of Ephrata, Wash., representing Seattle capitalists, has received a franchise for an electric railway in Douglas County, connecting Adrian, Ephrata and the Soap Lake district. L. F. Jones, Northwestern representative of the New York Central lines, was one of the applicants for the franchise, which grants the privilege of building a road "the motive power for which shall be other than steam." It is given out that negotiations will be opened with the Hanford Water Power Company on the Columbia, and with the Washington Water Power Company of Spokane for power. There is a possibility that the company will erect a power plant of its own, generating electricity by steam. The franchise stipulates that the road shall be begun within two years and finished within five years.

SPOKANE, WASH.—D. L. Huntington, general manager, has placed orders with the J. G. Brill Company, Philadelphia, for twenty-seven cars, twenty of them twenty-three ton, for delivery in March. Seven will be thirty-two ton cars. The twenty-three ton cars will be used on city lines. The cars will be 44 feet 8 inches long in all, and fitted with four 40-horsepower motors each. Of the seven cars for interurban service, five will be trailers, and two will be fitted with four 75-horsepower motors. The motor cars will be fitted with two compartments, a baggage room and smoking compartment.

SPOKANE, WASH.—H. D. Graves, right-of-way agent for the company, reports that he has assurances of free right of way for fully half of the line from Spokane to Miles, Wash., seventy-two miles. The road will touch at Davenport, Mondovia and Peach, on the Columbia River. He said: "Whether or not the line will enter the Indian Resrevation at this point for further extension I am not prepared to state, as many matters pertaining to right of way through the reservation must be taken up with the Government at Washington. The building of this line will mean much to Spokane. It will be built with the solidity of the Palouse line, and will practically be a railway operated by electricity. It will mean much business for Spokane, as it will afford direct and speedy transportation to the great growing regions of the Big Bend."

ILLUMINATION.

YAKIMA, WASH.—George Arrowsmith, superintendent of the Northwest Light and Water Company, which is owned chiefly by Robert E. Strahorn, of Spokane, has been appointed superintendent for the Strahorn water, light and power interests in the entire Yakima Valley. It is given out that $250,000 will be expended in providing light and power to the towns from Yakima to Kennewick. An order has been placed for $50,000 worth of wire. Experts are preparing plans for machinery. The company has a large water power plant at North Yakima, and will develop another at Kennewick, Wash.